The Unique Effects of Hope, Optimism, and Self-efficacy on Subjective Well-being and Depression in German Adults

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Abstract

Positive thinking is a source of mental health. Hope, optimism, and self-efficacy are three factors of positive thinking that are strongly correlated but distinct. Each construct independently relates to measures of mental health such as subjective well-being (SWB) and depression. However, research on the unique impact of hope, optimism, and self-efficacy on both SWB and depression is limited, and robust research on the distinctiveness of these factors and their independent contributions to predicting SWB and depression is needed. The present study used confirmatory factor analysis and structural equation modeling in a large (*n* = 6,077), older (above 40), German sample and found the following. First, the three factors of hope, optimism, and general self-efficacy better accounted for their individual items than a single overarching factor of positive thinking. However, because hope and self-efficacy were not identifiable as distinct latent constructs in this sample, they were modeled as one construct in subsequent analyses. Second, combined hope/self-efficacy and optimism had a strong positive relationship among themselves and a weak to moderate positive relationship with higher SWB and lower self-rated depression symptoms. Third, hope/self-efficacy and optimism in separate models had significant moderate to strong latent effects on SWB and depression. Fourth, and finally, hope/self-efficacy and optimism in the same model had unique weak to moderate latent effects on SWB and depression. The fact that hope and self-efficacy were not distinguishable in this sample ran contrary to the existing literature and greatly restricted the conclusions from this study. This limitation may be due to the measures being administered inappropriately. However, in general, the positive thinking factors were highly correlated with each other and were found to be significant predictors of higher well-being and lower depression.

Table of Contents

List of Figures

List of Tables

Introduction

Constructs of Positive Thinking

Research in positive psychology supports the idea that positive thinking contributes to mental health and well-being (Taylor & Brown, 1994). Positive cognitions aid both in recovery from mental disorders and relapse prevention and provide resilience when dealing with physical illness (MacLeod & Moore, 2000; Zauszniewski, Bekhet, & Suresky, 2009). Positive thinking leads to better outcomes by influencing how individuals perceive and then address difficulties (Naseem & Khalid, 2010). Many different constructs of positive thinking have been proposed.

Three constructs of positive thinking that have been the subject of decades of empirical research are hope (Snyder et al., 1991), optimism (Scheier & Carver, 1985), and self-efficacy (Bandura, 1982). These three constructs presuppose that human behavior is structured around the pursuit of goals. Motivation toward the goal increases as the individual perceives the goal is more likely to be achieved and as the goal increases in importance to the individual. Broadly speaking, hope, optimism, and self-efficacy are relatively stable cognitive traits that pertain to positive expectations of the future (Rand, 2017). As discussed in the following sections, years of research have refined the conceptualization of these constructs and demonstrated their association with mental health.

Hope

Hope has been conceptualized by Snyder as a positive expectation of the future based on a two-fold ability to generate specific pathways to goals and have the personal agency to implement those pathways to successfully achieve one's goals based on past success, present willingness, and future readiness (Snyder, 2002). Factor analysis supports the distinction

between these two components of hope, referred to as pathways and agency respectively as well as the higher order hope construct containing the two components (Edwards, Rand, Lopez, & Snyder, 2007). People high in pathways thinking can creatively find alternate routes to their goals in the face of difficulty. Agency thinking measures one's motivation to implement the pathway in pursuit of the goal. People high in agency thinking practice positive self-talk (ex. "I can do this").

Pathways and agency thinking are additive and complementary during the pursuit of goals. For example, a high hope individual facing a challenge will think of a path to the goal, have the agency to implement the path, and then alter the path and try again if the initial attempt falls short. People with high hope think they will accomplish their goals. They even see difficult goals as challenges they can conquer rather than threats they should avoid (Cheavens, Feldman, Woodward, & Snyder, 2006). Hope is consistently related to better psychotherapy outcomes, adaptive coping, emotional well-being, physical health, and academic performance (Cheavens, Michael, & Snyder, 2005; Snyder, 2002; Gallagher & Lopez, 2017).

Optimism

Optimism is a generalized positive expectancy that good things will happen rather than bad things, leading optimists to approach life's challenges with confidence rather than doubt (Carver, Scheier, & Segerstrom, 2010). Those higher in optimism have greater resilience and experience less distress when faced with stressful life events as compared with those lower in optimism. This may be because optimists are more likely to use active coping strategies and keep trying while pessimists resort to avoidant strategies such as wishful thinking and distractions (Nes & Segerstrom, 2006).

Optimists are more likely than pessimists to engage in social activities and build social networks (Brissette, Scheier, & Carver, 2002), perhaps because people prefer those who have positive views of the future (Helweg-Larsen, Sadeghian, & Webb, 2002). Consequently, optimists achieve higher goal-related performance (Chemers, Hu, & Garcia, 2001) and have better mental and physical health (Rasmussen, O'Byrne, Vandamente, & Cole, 2017; Carver, Scheier, & Segerstrom, 2010). Finally, research supports the idea that optimism can be learned through intentional practice (Seligman, 2006).

Self-efficacy

Finally, self-efficacy is the perceived capacity to do what is necessary to accomplish one's goals (Bandura, 1982). People with high self-efficacy believe they possess the ability to achieve their goals. They do not necessarily believe that the goal will actually be achieved, either because they do not want to apply themselves (as opposed to high hopers) or because of circumstances outside of their control (as opposed to optimists). Since self-efficacy pertains only to one's perceived ability, measures of self-efficacy ask about what the subject *can* do rather than *will* do.

Self-efficacy differs from self-esteem because one can consider oneself capable of reaching a goal while at the same time judging oneself to have low self-worth. Although self-efficacy is sometimes measured using a general self-efficacy scale, most research follows Bandura's conceptualization of self-efficacy as a domain-specific construct, with different measures depending on the context, such as health-related self-efficacy versus academic self-efficacy (Schwarzer & Jerusalem, 1999; Bandura, 2006).

Self-efficacy contributes to mental health throughout human development by leading to positive health behaviors and better emotional coping (Schwarzer, 2014). Individuals with

high self-efficacy believe they are capable of mastering both their thoughts and behaviors in order to achieve their goals (McCarthy & Newcomb, 2014). In addition, meta-analyses have reported that self-efficacy is positively associated with work performance and athletic performance (Bandura, 1997; Stajkovic & Luthans, 1998; Moritz, Fahrbach, & Mack, 2000; Gwaltney, Kahler, & Shiffman, 2009). Finally, several mechanisms have been proposed as sources of self-efficacy including mastery experiences, modeling the behavior of others,, social persuasion, and affective states (Bandura, 1982).

The Relationship Between Hope, Optimism, and Self-efficacy

Although hope, optimism, and self-efficacy are highly related, they can be distinguished both theoretically and empirically (Rand, 2017). Unlike hope and self-efficacy, optimism does not necessarily involve an evaluation of personal agency. On the other hand, hope and self-efficacy imply that one has the competence to achieve the goals that are within one's power (Luszcyzynska, Gutierrez-Dona, & Schwarzer, 2005). Optimism and self-efficacy differ from hope because they do not consider one's intention to achieve one's goals, only that one will (optimism) or could (self-efficacy) achieve one's goals. Unlike hope and optimism, self-efficacy does not include confidence that the goal will be achieved. For example, one could be confident in one's own ability while also believing that uncontrollable circumstances will prevent the goal from being achieved. Also, optimism is generalizable across beliefs, whereas hope and especially self-efficacy have domain-specific as well as generalized measures.

These theoretical arguments that hope, optimism, and self-efficacy are different are supported by empirical research. Studies using confirmatory factor analysis (CFA) have found that hope, optimism, and self-efficacy are best conceptualized as three distinct latent

constructs despite having moderate to high inter-correlations (r = .51 to r = .63; Herbert, 2011; Carifio & Rhodes, 2002; Magaletta & Oliver, 1999).

Hope, Optimism, Self-efficacy and Mental Health

Hope, optimism, and self-efficacy as aspects of positive thinking should relate to the complete spectrum of mental health, positively with positive mental health and negatively with mental illness. In the complete mental health model proposed by Keyes, positive mental health, also known as flourishing, has three factors: subjective, eudaimonic, and social well-being (Keyes, 2003). Subjective well-being includes positive emotion and life satisfaction, eudaimonic refers to positive psychological functioning such as having a sense of purpose, and social refers to positive relationships. In the complete mental health model, someone can have high positive mental health (flourishing) and still have high mental illness (psychopathology). Conversely, someone can have low mental illness (no psychopathology) but also low mental well-being (languishing). Mental health and mental illness uniquely predict functional impairment (Keyes, 2007).

The present study examines hope, optimism, and self-efficacy in relation to one indicator of positive mental health (subjective well-being) and one indicator of mental illness (self-reported depressive symptoms), thus representing one aspect of each dimension of complete mental health. Subjective well-being (SWB) has three components: high positive emotions, low negative emotions, and high satisfaction with life (Diener, 1984). Depression is a common psychopathology characterized by depressed mood, loss of interest or pleasure in former activities, inability to concentrate, loss of energy, and suicidal thoughts (APA, 2013).

Hope, Optimism, Self-efficacy and Subjective Well-being

Hope, optimism, and self-efficacy are theoretically and empirically related to SWB (Alarcon, Bowling, & Khazon, 2013). In Snyder's model of hope, people experience life satisfaction and positive affect after achieving goals, and they experience negative affect after failing to achieve goals. People with high hope are more likely to achieve their goals which makes it more likely for them to experience higher positive emotions, lower negative emotions and higher life satisfaction (Lee & Gallagher, 2017). Thus, theoretically high hopers should have higher SWB.

Several empirical studies support the theoretical relationship between hope and the components of SWB. For example, a recent longitudinal study of 975 Australian adolescents found that hope was a small but significant predictor of positive and negative affect after one year (r = .24 for positive affect; and r = -.10 for negative affect Ciarrochi, Parker, Kashdan, Heaven, & Barkus, 2015). A study of American adolescents found that hope was significantly associated with life satisfaction after one year (r = .41; Valle, Huebner, & Suldo, 2006).

Optimists also believe good things will happen rather than bad things. The anticipation of a future good is accompanied by positive emotion such as confidence and the anticipation of a future evil is accompanied by negative emotion such as fear or anxiety (King, 2012). Thus, optimists should have more positive emotions and, therefore, higher levels of SWB than pessimists. A recent meta-analysis found that optimism has a moderate to large association with the three aspects of SWB of positive affect (r = .44), negative affect (r = -.42), and satisfaction with life (r = .43; Alarcon et al., 2013). These associations hold even after controlling for factors like personality and spirituality (Ciarrocchi & Deneke, 2005).

People high in self-efficacy have confidence in their ability to perform certain actions. Self-efficacy has been proposed as a common mediator in the effectiveness of diverse treatments for depression because people with depression share the belief that they are not capable of achieving positive outcomes that would result in life satisfaction (Bandura, 1997). In other words, people with depression believe they are incapable of helping themselves, the very opposite of self-efficacy. Self-efficacy could lead to higher positive emotions and lower negative emotions through mechanisms such as self-esteem, engagement, and job satisfaction (Lightsey, Burke, Ervin Henderson, & Yee, 2006; Ouweneel, Le Blanc, & Schaufeli, 2013; Moè, Pazzaglia, & Ronconi, 2010). Self-efficacy is conceptually related to items of higher positive affect (such as “strong” and “proud”) and items of lower negative affect (such as “scared”, “nervous”, and “afraid”). Therefore, self-efficacy should be associated with higher SWB (Luszczynska, Gutierrez-Dona, & Schwarzer, 2005).

Research shows that people with high self-efficacy are more persistent in the pursuit of their goals and are more willing to challenge themselves, both of which could lead to higher emotional well-being (Bandura, 1997). In a study with Chinese college students, general self-efficacy was associated with significantly higher levels of SWB components of positive affect (r = .49) and life satisfaction (r = .43; ps < .01; Tong & Song, 2004). Other studies have found statistically significant associations between self-efficacy and the components of SWB, with a moderate correlation between self-efficacy and life satisfaction (r = .34; Strobel, Tumasjan, & Spörrle, 2011), and a moderate correlation between self-efficacy and positive affect (r = .41; Culbertson, Fullagar, & Mills, 2010).

Hope, Optimism, Self-efficacy and Depression

Hope, optimism, and self-efficacy also have theoretical and empirical associations with depression. Hope should relate with lower depression because successful pursuit of goals increases positive affect whereas failed pursuit increases sadness, a component of negative affect and a common symptom of depression (Jones, Papadakis, Orr, & Strauman, 2013; Ritschel & Sheppard, 2017). Furthermore, the hope components of agency and pathways reflect an interest in engaging in activities, since they are based on the individual's desire and plan to achieve goals. On the other hand, the lack of engagement in activities is a symptom of depression. In support of these theoretical associations, a recent meta-analysis found a strong negative association between hope and depression, using a broad definition of depression to include self-report and clinical diagnosis (r = -.48; Alarcon et al., 2013). A recent study on cancer patients found depression and hopelessness to be distinct constructs that contribute to one another (Rodin, Lo, Mikulincer, Donner, Gagliese, 2009).

Optimism is theoretically linked with lower depression, because optimists believe the future holds good things whereas people with depression do not. Like high hopers, optimists have lower levels of components of negative affect such as sadness, sadness being characteristic of depression. Empirically, the meta-analysis of Alarcon et al. also found a strong negative correlation between optimism and depression (r = -.54). In one study of elderly men, optimism predicted fewer depressive symptoms after a 15-year follow up with an odds ratio of .23, even after adjusting for age and self-rated health (Giltay, Zitman, & Kromhout, 2006).

Those with low self-efficacy could be more likely to develop depression because they no longer believe their goals can be achieved as a result of their personal action. This could

lead to a loss of interest in pursuing goal-related activities and, in general, negative emotions. A longitudinal study on Native American adolescents found that academic self-efficacy predicted lower self-reported depression symptoms after 3 years, with a lagged effect of r = -.15 (Scott & Dearing, 2012). A large, multicultural study found GSE was related to lower negative affect and depression (Luszczynska, Scholz, & Schwarzer, 2005).

However, the relationship between self-efficacy and depression may not be direct, because people with low self-efficacy could still believe their goals will be attained by factors outside of their control as is characteristic of optimism. In fact, one study using structural equation modeling (SEM) found that optimism partially mediated the relationship between self-efficacy and well-being as measured by the Oxford Happiness Inventory (Karademas, 2006). As detailed above, much research has found that hope, optimism, and self-efficacy, when examined separately, predict positive mental and physical health.

Unique Contributions to Subjective Well-being and Depression

Based on the theoretical and empirical differences between hope, optimism, and self-efficacy, one would expect them to have unique effects on SWB and depression over and above their common contributions. Optimists do not necessarily believe their personal choices are responsible for positive outcomes, so optimists compared to high hopers may relate differently to aspects of SWB and depression that refer to personal agency. For example, one indicator of lower satisfaction with life (and therefore lower SWB) is regretting past decisions, and one symptom of depression is loss of interest in normal activities. Those high in self-efficacy and those high in hope both have confidence in their abilities, but high hopers also consider specific ways to achieve their goals which could extend beyond personal competence. This could result in hope and self-efficacy differentially relating to

aspects of SWB such as positive external conditions (satisfaction with life) and questions of personal competence (depression). Specifically, the pathways component of hope could account for the aforementioned life conditions and perception of life success whereas the self-efficacy items may not. Finally, people high in optimism believe their goals will be achieved, whereas people high in self-efficacy do not necessarily believe their goals will be achieved. Therefore, optimism and self-efficacy may relate differently to aspects of SWB and depression that pertain to contentment with one's past life and expectations of future life satisfaction.

With these theoretical differences in mind, some studies have looked at the unique contribution of one of these variables while controlling for the presence of one of the other two, but very few studies have looked at the unique effects when all three are in the same model. This makes it very difficult to determine to what extent the constructs are different from one another and how they differentially relate to constructs of complete mental health.

Regarding the unique effects of hope and optimism on SWB, the results are mixed. A study of American undergraduates using structural equation modeling found that optimism had a stronger association with SWB than hope did, although both predicted SWB with moderate to large effect sizes (average completely standardized latent regression effects of $B = .47$ versus $B = .27$; Gallagher & Lopez, 2009). Another study with graduate students found that hope significantly predicted higher SWB even after controlling for optimism ($\Delta R^2 = .03$ for negative affect, $\Delta R^2 = .06$ for positive affect, and $\Delta R^2 = .13$ for satisfaction with life), but the reverse was not true ($\Delta R^2 = .01$ for negative affect, $\Delta R^2 = .00$ for positive affect, and $\Delta R^2 = .01$ for satisfaction with life; Ciarrocchi & Deneke, 2005). However, this study

controlled for personality which blurs the direct comparison between hope and optimism since other studies do not control for personality.

Another study of Singaporean high school students used hierarchical multiple regression and found that hope and optimism were about equal predictors of life satisfaction ($\Delta R^2 = .07$ and $\Delta R^2 = .07$ respectively; Wong & Lim, 2009). Consequently, it is unclear what the unique effects of hope and optimism on SWB are, although the study showing a stronger effect of optimism on SWB seems to provide the strongest support since it had the largest sample size $n = 591$ and controlled for measurement error using SEM (Gallagher & Lopez, 2009).

Regarding the unique effects of hope and optimism on depression, the results are mixed. In a study of US adult primary care patients, hope predicted more unique variance in self-reported depression than optimism after controlling for demographic variables including marital status and education ($\Delta R^2 = -.43$ and $\Delta R^2 = -.33$ respectively; Chang, Yu, & Hirsch, 2013). Similarly, in a study of Israeli traumatic brain injury patients, hope was better at uniquely predicting self-reported depressive symptoms than optimism ($\beta = -.42$ and $\beta = -.30$ respectively, ΔR^2 was not reported; Peleg, et al., 2009). However, in a study of Southeast Asian students, optimism predicted more unique variance in self-reported depressive symptoms than hope ($\Delta R^2 = .09$ and $\Delta R^2 = .03$ respectively; Wong & Lim, 2009). Although findings are mixed, the above studies suggest that hope may be a stronger predictor of depression than optimism when both are in the same model.

Only one study examined the unique effects of hope and self-efficacy on life satisfaction. This study found that hope was a better predictor of life satisfaction than self-efficacy, although the comparison is confounded by the fact that another positive thinking

predictor was in the model, namely eustress, a unique measure of good stress (O'Sullivan, 2011). No study has examined the unique effects of hope and self-efficacy with depression as an outcome, and no study has looked at the unique effects of optimism and self-efficacy with either SWB or depression as outcomes.

Several studies have looked at hope, optimism, and self-efficacy in the same model with outcomes such as academic achievement and locus of control (Feldman & Kubota, 2015; Carifio & Rhodes, 2002). Looking at the unique effects of hope, optimism, and self-efficacy in the same model, only one study used well-being as an outcome and only one study used depression. The former study found that optimism had the greatest unique effect on a general measure of well-being followed closely by self-efficacy and then hope (β =.34, β = .33, β = .22, ΔR^2 was not reported; Magaletta & Oliver, 1999). The latter study found that hope was the highest predictor of depressive symptoms, followed by self-efficacy and optimism which had similar effect sizes (β = -.30, β = -.22, β = -.19, ΔR^2 was not reported; Yang, Liu, Wang, Wang, & Wang, 2014). No study has examined these three positive constructs with both well-being and depression as outcomes.

In sum, few studies have looked at the unique effects of hope, optimism, and self-efficacy in the same model. This limits our knowledge of the effect of one positive construct over and above the effect of the others. Furthermore, no study has looked at the unique effects of hope, optimism, and self-efficacy on both positive and negative indicators of complete mental health such as higher SWB and lower depression. Historically, many studies that have examined the relationships among our variables of interest have utilized small samples of American college students and have not controlled for measurement error. The present study replicates and expands on previous findings. The sample size is large (n >

6,000) and taken from an older (above 40), non-American population. SEM is used to control for measurement error. Finally, the outcomes of SWB and lower depression are chosen in order to represent aspects of the complete mental health model.

The Present Study

The present study has four aims. First, to test whether the individual items of hope, optimism, and self-efficacy are better accounted for by those three factors than by one overarching factor of positive thinking. Second, to measure the latent correlations of hope, optimism, self-efficacy, SWB, and depression. To label effect size magnitudes, I will use the conventional cutoffs of weak $r = .1$, moderate $r = .3$, and strong $r = .5$ (Cohen, 1992). Third, to quantify the unique effects of hope, optimism, and self-efficacy on SWB and depression with a separate model for each predictor. Fourth, to quantify the unique effects of hope, optimism, and self-efficacy on SWB and depression with all predictors in the same model. For aims three and four, SWB is modeled as one factor composed of the items of positive affect, negative affect reverse-coded, and satisfaction with life.

- **Aim 1**: To test whether hope, optimism, and self-efficacy will be better modeled by three factors than one big factor, as each theory would suggest.
- **Hypothesis 1**: The individual items of hope, optimism, and self-efficacy will have a strong latent correlation with the three factors of hope, optimism, and self-efficacy and will have a weaker latent correlation with one general factor of positive thinking.
- **Aim 2:** To examine the latent correlations between hope, optimism, self-efficacy, SWB, and depression.

- **Hypothesis 2:** Hope, optimism, and self-efficacy will be moderately to strongly inter-correlated. They will be moderately to strongly correlated with SWB in the positive direction, with a slightly stronger relationship for optimism, then self-efficacy, then hope. They will be weakly to moderately correlated with depression in the negative direction, with a slightly stronger relationship for hope, then self-efficacy, then optimism.
- **Aim 3:** To quantify the effects of hope, optimism, and self-efficacy on SWB and depression when examined in isolation.
- **Hypothesis 3:** When entered in separate models, hope, optimism, and self-efficacy will have weak to moderate effects on SWB and depression with rank orders consistent with Hypothesis 2.
- **Aim 4:** To determine to what extent hope, optimism, and self-efficacy have unique latent effects on SWB and depression.
- **Hypothesis 4:** When entered in the same model, hope, optimism, and self-efficacy will have weak to moderate unique effects on SWB, with a slightly stronger relationship for optimism, then self-efficacy, then hope. When entered in the same model, hope, optimism, and self-efficacy will have weak to moderate unique effects on depression, with a slightly stronger relationship for hope, then self-efficacy, then optimism.

Methods

Procedures

The data were taken from the German Ageing Survey (DEAS), a nationally representative survey of the German population 40 years and above (Engstler & Schmiade, 2013). The

study was conducted to assess how people in this age group live and how their life situations change over the course of the study. The study was funded by Germany's Federal Ministry of Family Affairs, Senior Citizens, Women and Youth. Data have been collected in five waves from 1996 to 2014. The sample was stratified by age, gender, and physical location (East versus West Germany). The present study used data from the third wave which was collected in 2008. In this wave, there were two primary methods of data collection: all subjects completed personal interviews (n = 8,196) and were mailed an additional self-report questionnaire which some of the participants chose to complete (n = 6,077). This wave was chosen because it was the largest wave that included the study specific variables. Since all the variables of interest to the present study except depression were measured only in the additional self-report, the present study only used the subjects who completed the additional self-report. Thus, the present study included 6,077 German adults from the third wave (2008) of the DEAS. Internal consistency was measured using Cronbach's Alpha. The sample was 51.3% male, and ages ranged from 40-95 (M = 62.49, SD = 11.63). Data on race/ethnicity were not collected.

Measures

Hope was measured with the Adult Hope Scale (Snyder et al., 1991), the most widely-established measure of adult trait hope in the literature (Rose & Sieben, 2017). The scale was translated into German by the DEAS project (Dittman-Kohli et al., 1997). Participants rated themselves on 8 items using a 4-point Likert scale as opposed to the standard 8-point Likert scale recommended by Snyder et al. (1991). The distraction questions were eliminated, and the mean value was calculated so higher values equal higher hope. Less

than 0.1% of the total sample were missing all items for the hope scale. A meta-analysis of 16 studies found the internal consistency of the Adult Hope Scale to be $\alpha = .82$ (Hellman, Pittman, & Munoz, 2013). Much research has attested to the convergent and divergent validity of this scale (Snyder, 2002). Since most experimental studies of the AHS have taken place in the US, there is limited evidence of validity in this German sample. Although the DEAS project did not report any additional validity statistics on their translation of the Adult Hope Scale, a previously cited meta-analysis found that the internal consistency did not have a statistically significant difference depending on demographic characteristics such as whether the sample was Caucasian or not. The internal consistency in the present sample was $\alpha = .83$.

Optimism was measured with the Affective Valence of Future Time Perspective Scale (Brandtstädter & Wentura, 1994). Participants rated themselves on 5 items using a 4-point Likert scale. To better distinguish the unique effect of optimism over hope, one item was discarded because it directly asked about hope ("For me the future is full of hope"), thus leaving 4 items. One negatively worded item was reverse coded and then the mean was calculated so higher values equal higher optimism. Less than 0.1% of the total sample were missing all items for the optimism scale. The present scale was designed primarily for the DEAS, and to the author's knowledge, there is no available research on the validity and reliability of the scale outside the DEAS. The internal consistency in the present sample was $\alpha = .86$.

Self-efficacy was measured with the Generalized Self-efficacy Scale (Schwarzer & Jerusalem, 1995). The German version of the scale was used (Schwarzer & Jerusalem, 1999). Participants rated themselves on 5 items using a 4-point Likert scale. Less than 0.1% of the

total sample were missing all items for the self-efficacy scale. The original version of this scale had an internal consistency of α = .82 in a German sample (Jerusalem & Schwarzer, 1982). The internal consistency in the present sample was α = .81.

Positive and Negative Affect were measured with a German translation of the Positive and Negative Affect Scale (Watson, Clark, & Tellegen, 1988). The scale was translated into German by the DEAS project based on Smith et al., 1996. The PANAS is a commonly used measure of positive and negative affect. Participants rated themselves on 20 items using a 5-point Likert scale. Less than 1% of the total sample were missing all items for positive or negative affect. The internal consistency of the PANAS in a large European sample was α = .89 and Positive Affect was α = .57 (Crawford & Henry, 2004). In the present sample, the internal consistency of Positive Affect was α = .87 Negative Affect was α = .87.

Life Satisfaction was measured with a German translation (Schumacher, Klaiberg, & Brähler, 2003) of the Satisfaction with Life Scale (Pavot & Diener, 1993). Participants rated themselves on 5 items using a 5-point Likert scale. Less than 1% of the total sample were missing all items for the life satisfaction scale. A separate large-scale study on the reliability of this scale found an internal consistency of α = .92 (Glaesmer, Grande, Braehler, & Roth, 2011). Scores were recoded so higher values mean higher life satisfaction. The internal consistency in the present sample was α = .85.

Depression was measured with the Allgemeine Depressions Skala (ADS; Hautzinger & Bailer, 1993). This is a short form of the German translation of the Center for Epidemiologic Studies Depression Scale (Radloff, 1977). Participants rated themselves on 15 items using a 4-point Likert scale. Two negatively-worded items were recoded, and the mean

was calculated so high values represent high depression. Less than 1% of the total sample were missing all items for the depression scale. Another study using the ADS found the internal consistency in a German sample to be $\alpha = .95$. The internal consistency in the present sample was $\alpha = .86$. Based on a cutoff score established for the ADS, 4.6% of the present sample met a clinically diagnosable level of depression (Lehr, Hillert, Schmitz, & Sosnowsky, 2008).

Analytic Plan

Mplus version 8 (Muthén & Muthén, 1998-2017) was used to calculate means, standard, deviations, and inter-correlations for hope, optimism, self-efficacy, positive affect, negative affect, satisfaction with life, and depression. Mplus was also used to test study hypotheses using confirmatory factor analysis (CFA) and structural equation modeling (SEM). Item-level missing data was imputed using robust maximum likelihood estimation.

Parcels were constructed for those variables that contained more than 5 items. Parceling is a common technique used in CFA and SEM by which the individual items of a variable are split up into groups, and the items of each group are averaged together to yield the parcel. This technique results in better reliability than the individual items (Little, Cunningham, Shahar, & Widaman, 2002). The 8-items of the hope variable were grouped into four parcels, with each parcel containing one agency and one pathways item which were averaged together. The 15-items of the depression variable were randomly grouped into 3 parcels of 5 items. The optimism, self-efficacy, and satisfaction with life scales each contain only 5 items or less and therefore were not parcelled.

The following recommended criteria were used to test the fit of the CFA and SEM models. Root mean square error of approximation (RMSEA) should be below .05 for close fit

or .05-.08 for acceptable fit (Steiger & Lind, 1980). The lower bound of the 90% confidence interval of RMSEA should be below .05 and the upper bound should be below .10 (MacCallum, Browne, & Sugawara, 1996). The standardized root mean-square residual (SRMR) should be below .06 for good fit (Schumacker & Lomax, 2012). The comparative fit index (CFI) should be above .90 for good fit and Tucker Lewis Index (TLI) should be above .95 for good fit (Kline, 2005; Hooper, Coughlan, & Mullen, 2008).

First, CFA was used to test whether the items of hope, optimism, and self-efficacy were better accounted for by one overarching factor (Figure 1) or three distinct constructs (Figure 2) using a direct comparison with chi-square of these two nested models as well as comparing correlations and factor loadings. Second, CFA was used to quantify the latent inter-correlations between hope, optimism, and self-efficacy on the one hand and SWB and depression on the other hand (Figure 3). Third, SEM was used to quantify the unique latent effects of hope, optimism, and self-efficacy in isolation on SWB and depression, when hope, optimism, and self-efficacy are in different models (Figure 4). Fourth, SEM was used to quantify the unique latent regression weights of hope, optimism, and self-efficacy on SWB and depression when hope, optimism, and self-efficacy were in the same model (Figure 5).

Results

Aim 1: Factor Structure of Positive Thinking

The factor structure of positive thinking was examined using CFA in order to determine whether the items of hope, optimism, and self-efficacy were better accounted for by one latent construct or three latent constructs based on overall model fit, chi-square test of model comparision, latent correlations, and factor loadings. The model fit for the three-factor model was superior to the one-factor model and demonstrated good fit on all indices, (χ^2 (df

= 62) = 1025.14, $p < .01$, RMSEA = .05, CFI = .96, TLI = .96, SRMR = .03; Figure 2). The items had good factor loadings, ranging from $\lambda = .61$ to $\lambda = .80$. As expected, there were strong latent correlations between hope and optimism ($r = .77$; with 95% confidence interval of .75 : .79), hope and GSE ($r = .98$; .97 : .99), and GSE and optimism ($r = .70$; .67 : .72).

The model fit for the one-factor model of positive thinking was acceptable for SRMR but below the acceptable standard for RMSEA, CFI, and TLI, (χ^2 (df = 65) = 3157.37, $p <$ .01, RMSEA = .09, CFI = .88, TLI = .86, SRMR = .05; Figure 1). The items had good factor loadings, ranging from $\lambda = .52$ to $\lambda = .79$. The chi-square difference test between the two models was significant, (scaled χ^2 (df = 3) = 2044.01, $p < .001$ for the difference test). The 3-factor model was superior to the 1-factor model given the better model fit, marginally higher factor loadings, and significant chi-square difference test.

Although the 3-factor model fit better than the 1-factor model, the 3-factor model demonstrated an unexpectedly high latent correlation ($r = .98$) between hope and GSE, leading us to think hope and GSE were not better modeled as different constructs in this sample. Therefore, I explored a two-factor model of positive thinking which combined hope and GSE as one latent construct (Figure 6). This model also showed good fit on all indices, (χ^2 (df = 64) = 1110.45, $p < .01$, RMSEA = .05, CFI = .96, TLI = .95, SRMR = .03). Furthermore, the chi-square difference test comparing the 2-factor model and 3-factor model was significant, (scaled χ^2 (df = 2) = 85.31, $p < .001$) meaning the one that fits the data better should be preferred. The items had good factor loadings, ranging from $\lambda = .61$ to $\lambda = .81$. As expected, there was a strong latent correlation between the hope/GSE factor and optimism ($r = .74$; .72 : .76). Although the 2-factor model and 3-factor model had similar fit and factor loadings, the significant chi-square difference test and the reduction of the .98 latent

correlation indicated the 2-factor model combining hope and GSE better represented the factor structure of positive thinking in this sample. Therefore, the two-factor model was used for all subsequent analyses. Although the absence of a separate hope and GSE constructs limits the comparison of the present results to previous studies, the present study still distinguishes optimism from the agency construct represented by combined hope and GSE. I thought it would not be appropriate to separate hope and GSE in subsequent analyses, because, in this sample, they are not adequately distinguishable as separate constructs. Therefore, if I did treat them as separate constructs, any conclusions drawn from them would be misleading.

Aim 2: Latent Correlations of Positive Thinking Constructs on SWB and Depression

Next, latent correlations among all predictors and outcomes were analyzed. As mentioned above, hope and GSE were combined as a latent construct. The CFA model of hope/GSE, optimism, SWB, and depression showed good fit, χ^2 (df = 146) = 2564.78, $p <$ .01, RMSEA = .05, CFI = .95, TLI = .94, SRMR = .04; Figure 7). However, MPlus reported a PSI error indicating the latent variable covariance matrix was not positive definite. This error was likely due to the abnormally high latent correlations between SWB and the combined hope/GSE factor (r = .92) and SWB and optimism (r = .92). To address the PSI error and the high latent correlations, I separated SWB into its three component factors of positive affect, negative affect, and satisfaction with life and ran the analysis again (Figures 8a and 8b). The new analysis used CFA to quantify the latent correlations between hope/GSE, optimism, positive affect, negative affect, satisfaction with life, and depression (Figure 9). This model showed acceptable fit, χ^2 (df = 309) = 4359.35, $p <$ .01, RMSEA = .05, CFI = .94, TLI = .94, SRMR = .04). For all subsequent analyses, I modeled SWB as 3

lower order factors of positive affect, negative affect, and satisfaction with life, rather than 1 overarching factor.

In this model, hope/GSE had a strong positive latent correlation with optimism (r = .74; .72 : .76), positive affect (r = .70; .68 : .72), and satisfaction with life (r = .68; .67: .70), as well as a moderate to strong negative correlation with negative affect (r = -.42; -.45 : -.39) and depression (r = -.44; -.47 : -.41). Optimism had a strong positive latent correlation with satisfaction with life (r = .77; .75 : .78) and positive affect (r = .62; .59 : .64), a strong negative correlation with depression (r = -.52; -.55 : -.50), and a moderate to strong negative correlation with negative affect (r = -.41; -.44 : -.39). All latent correlations were statistically significant at $p < .001$. As expected, the positive thinking constructs had strong correlations with each other, and with satisfaction with life, positive affect, and depression, and negative affect, in that order. These correlations indicate that the positive thinking constructs of hope/GSE and optimism are more strongly related to the presence of positive indicators, such as satisfaction with life and positive affect, than the absence of negative indicators, such as lower depression and negative affect.

Aim 3: Effects of Positive Thinking Traits in Isolation on SWB and Depression

Next, I quantified the associations between each predictor in isolation on all the outcomes using SEM. The model of hope/GSE predicting positive affect, negative affect, satisfaction with life, and depression showed acceptable fit, χ^2 (df = 220) = 3136.49, $p < .01$, RMSEA = .05, CFI = .95, TLI = .94, SRMR = .04; Figure 10). Hope/GSE was a strong predictor of higher positive affect (β = .70; .68 : .72) and satisfaction with life (β = .69; .67 : .71) as well as a moderate predictor of lower negative affect (β = -.42; -.39 : -.45), and depression (β = -.44; -.47 : -.41). Hope/GSE in isolation predicted a large amount of variance

in positive affect (R^2 = .49), and satisfaction with life (R^2 = .47), and a moderate to large amount of variance in depression (R^2 = .19) and negative affect (R^2 = .18). These results suggest that hope/GSE is a strong predictor of both positive and negative outcomes, but a stronger predictor of positive outcomes.

The model of optimism in isolation predicting positive affect, negative affect, satisfaction with life, and depression showed acceptable fit, χ^2 (df = 125) = 2193.61, p < .01, RMSEA = .05, CFI = .95, TLI = .94, SRMR = .04; Figure 11). Optimism was a strong predictor of higher satisfaction with life (β = .77; .75 : .79), a moderate to strong predictor of higher positive affect (β = .62; .60 : .65), a moderate predictor of lower negative affect (β = -.42; -.39 : -.44), and a moderate predictor of lower depression (β = -.52; -.55 : -.50). Optimism in isolation predicted a large amount of variance in satisfaction with life (R^2 = .59), positive affect (R^2 = .39), and depression (R^2 = .27), and a moderate to large amount of variance in negative affect (R^2 = .17). These results suggest that optimism is a stronger predictor of positive outcomes than negative outcomes.

As expected, hope/GSE and optimism in isolation were strong predictors of satisfaction with life, positive affect, and lower depression. However, contrary to our expectation, hope/GSE and optimism in isolation were only moderate to strong predictors of less negative affect. Comparing hope/GSE and optimism, hope/GSE was a stronger predictor of positive affect, but weaker predictor of satisfaction with life and depression. Hope/GSE and optimism were similar predictors of negative affect.

Aim 4: Unique Effects of Positive Thinking Traits on SWB and Depression

Finally, I quantified the unique contribution of hope/GSE and optimism on all the outcomes when both positive expectancy constructs were in the same model. To do this, I

used SEM to quantify the latent regressions of hope/GSE and optimism on positive affect, negative affect, satisfaction with life, and depression. The model showed acceptable fit, χ^2 (df = 309) = 4359.35, $p < .01$, RMSEA = .05, CFI = .94, TLI = .93, SRMR = .04; Figure 12). Hope/GSE was a moderate predictor of higher positive affect (β = .53; .49 : .57), a weak predictor of higher satisfaction with life (β = .26; .22 : .30), as well as a weak predictor of lower negative affect (β = -.25; -.20 : -.30) and depression (β = -.12; -.17 : -.06). Optimism was a moderate predictor of higher satisfaction with life (β = .57; .53 : .61), a moderate predictor of lower depression (β = -.44; -.49 : -.39), a weak predictor of higher positive affect (β = .22; .18 : .27), and a weak predictor of lower negative affect (β = -.23; -.18 : -.28). Thus hope/GSE was stronger than optimism at predicting positive affect, but optimism was stronger than hope/GSE at predicting satisfaction with life and depression. Hope/GSE and optimism were comparable predictors of negative affect. Combined, hope/GSE and optimism predicted a large amount of variance in satisfaction with life (R^2 = .62), positive affect (R^2 = .51), and depression (R^2 = .28), and a moderate to large amount of variance in negative affect (R^2 = .20). These results suggest that hope/GSE and optimism are stronger predictors of SWB than depression. Comparing the positive psychology constructs in isolation versus combined, I found that the predictive power of hope/GSE and optimism on positive affect, negative affect, satisfaction with life, and depression overlapped to a high degree. Hope/GSE was a stronger predictor of positive affect, optimism was a stronger predictor of satisfaction with life and depression, and the two were comparable predictors of negative affect.

Discussion

The present study examined the associations between hope, optimism, self-efficacy SWB, and depression. First, I measured the factor structure of hope, optimism, and GSE

using CFA, and found that the positive psychology constructs of hope, optimism, and self-efficacy were better modeled by three distinct factors than one over-arching factor. This result is consistent with previously published CFAs of hope, optimism, and self-efficacy (Herbert, 2011; Carifio & Rhodes, 2002; Magaletta & Oliver, 1999). However, contrary to our expectation that was based on the existing literature, an additional CFA found that hope and self-efficacy were better identified as two factors rather than one factor. Therefore, I combined hope and self-efficacy as one factor (hope/GSE) for all subsequent analyses.

The one-factor model of hope/GSE runs contrary to most of the literature on hope and self-efficacy. However, there is evidence that the specific measures of hope and self-efficacy used in this study, namely the Adult Hope Scale and Schwarzer's GSE scale, are better modeled as one factor rather than two (Zhou & Kam, 2016). Specifically, Zhou and Kam found that when the items of these two measures were mixed together, the differences of the constructs were negligible within a Chinese sample. As in the Zhou and Kam study, in the present study, the items of the hope measure and the GSE measure were mixed together, contrary to the published suggestions on how to administer these measures. These changes to the assessment tools likely contributed to the inability to adequately distinguish between the constructs of hope and GSE in the present study, which in turn, greatly limited the ability to address the subsequent aims of the study.

Second, I used CFA to examine the latent correlations between hope, optimism, GSE, SWB, and depression when all were in the same model (Figure 3). However, even after using the combined hope and self-efficacy factor, MPlus reported an error that the covariance matrix was not positive definite (Figure 7). Since the SWB factor had lower loadings and abnormally high latent correlations, a CFA was conducted to examine the factor structure of

SWB. Contrary to our expectation, SWB was better modeled as 3 lower order factors of positive affect, negative affect-reverse coded, and satisfaction with life, rather than 1 overarching factor. Although we did not expect to model SWB as three lower order factors, doing so does not present empirical problems. Therefore, in all subsequent analyses, we modeled SWB as 3 lower order factors.

I then reexamined the latent correlations between all variables, but this time separating SWB into its 3 component factors in addition to combining hope and self-efficacy (Figure 9). I found a strong latent correlation between hope/GSE and optimism (r = .74), positive affect (r = .70), and satisfaction with life (r = .68). In addition, hope/GSE had a moderate to strong negative correlation with negative affect (r = -.42) and depression (r = -.44). Optimism had a strong positive correlation with satisfaction with life (r = .77) and positive affect (r = .62). Optimism had a strong negative correlation with depression (r = -.52) and a moderate to strong negative correlation with negative affect (r = -.41). All latent correlations were statistically significant at $p < .001$. These correlations indicate that the positive thinking constructs of hope/GSE and optimism are more strongly related to the presence of positive indicators, such as satisfaction with life and positive affect, than the absence of negative indicators, such as lower depression and negative affect. These results are in line with research on hope, optimism, and GSE, however, the necessity of combining hope and self-efficacy makes it difficult to distinguish the unique correlations of hope and GSE in this sample and greatly limits the extent to which these results can be meaningfully interpreted (Alarcon, Bowling, & Khazon, 2013; Luszczynska, Scholz, & Schwarzer, 2005).

Third, I used SEM to measure the latent regressions of hope/GSE and optimism on SWB and depression with hope/GSE and optimism in separate models. The model of

hope/GSE predicting positive affect, negative affect, satisfaction with life, and depression showed good fit. Hope/GSE was a strong predictor of higher positive affect and satisfaction with life as well as a moderate predictor of lower negative affect and depression. Hope/GSE in isolation predicted a large amount of variance in positive affect and satisfaction with life, as well as a moderate to large amount of variance in depression and negative affect. These results suggest that hope/GSE is a strong predictor of both positive and negative outcomes, but a stronger predictor of positive outcomes.

The model of optimism in isolation predicting positive affect, negative affect, satisfaction with life, and depression also showed good fit. Optimism was a strong predictor of higher satisfaction with life, a moderate to strong predictor of higher positive affect, and a moderate predictor of lower negative affect and depression. Optimism in isolation predicted a large amount of variance in satisfaction with life, positive affect, and depression, and a moderate to large amount of variance in negative affect. These results suggest that optimism is a stronger predictor of positive outcomes than negative outcomes. Thus, hope/GSE and optimism in isolation were about equally strong predictors of positive affect, negative affect, satisfaction with life, and depression. Specifically, in accord with the hypothesized expectations, hope/GSE and optimism in isolation were strong predictors of satisfaction with life, positive affect, and lower depression as well as moderate to strong predictors of less negative affect.

The above results are in line with research that found hope, optimism, and self-efficacy strongly related to each other (Alarcon, et al., 2013). Furthermore, the above results are in accord with research that found hope (Ciarrochi, Parker, Kashdan, Heaven, & Barkus, 2015; Alarcon et al., 2013; Ciarrocchi & Deneke, 2005), optimism (Alarcon et al., 2013;

Ciarrocchi & Deneke, 2005), and self-efficacy (Lightsey, Burke, Ervin Henderson, & Yee, 2006) more strongly correlated with the presence of positive indicators rather than the absence of negative indicators.

Fourth, I examined the latent regressions of hope/GSE and optimism on positive affect, negative affect, satisfaction with life, and depression when all were in the same model. This structural equation model showed acceptable fit. In this model, hope/GSE was a moderate predictor of higher positive affect, a weak predictor of higher satisfaction with life, and a weak predictor of lower negative affect and depression. Optimism was a moderate predictor of higher satisfaction with life, a moderate predictor of lower depression, a weak predictor of higher positive affect, and a weak predictor of lower negative affect. Combined, hope/GSE and optimism predicted a large amount of variance in satisfaction with life, positive affect, and depression, and a moderate to large amount of variance in negative affect.

Thus, when hope/GSE and optimism were in the same model, hope/GSE was stronger than optimism at predicting positive affect, but optimism was stronger than hope/GSE at predicting satisfaction with life and depression. These findings indicate that a more agency based positive expectancy (hope/GSE) is weaker at predicting satisfaction with life and depression, then a more generalized positive expectancy (optimism). Hope/GSE and optimism were comparable predictors of negative affect. These results again suggest that hope/GSE and optimism are stronger predictors of positive outcomes than negative outcomes. Comparing the positive psychology constructs in isolation versus combined, I found that the predictive power of hope/GSE and optimism on positive affect, negative affect, satisfaction with life, and depression overlapped to a high degree. Hope/GSE was a

stronger predictor of positive affect, optimism was a stronger predictor of satisfaction with life and depression, and the two were comparable predictors of negative affect.

That being said, the necessity of modeling hope and GSE as one construct greatly reduces the ability to meaningfully interpret the comparison between hope, GSE, and optimism for the following reasons. The hope/GSE construct combines two constructs that have clear theoretical and empirical differences in the literature (Carifio & Rhodes, 2002). While hope and GSE both capture the agent's belief in their capacity to accomplish the goal, hope also includes the agent's specific pathways to accomplish the goal whereas GSE does not. On the other hand, optimism captures neither the agentic component nor the pathways component, but only consists in a belief that the goal will be accomplished without specifying how. One could make the argument that hope/GSE represents a construct centered around agency whereas optimism does not. However, given the modifications made to the assessment tools in this study, the necessity of modeling hope and GSE as one construct could just as well be due to the method of administering the measures as to actual differences in these positive psychology constructs in a German sample.

Limitations

The biggest limitation was that, contrary to a large body of literature, self-efficacy and hope were not identifiable as distinct latent constructs in this sample. To test whether this was an artifact of the 2008 wave, I replicated the analyses for the 2011 wave of the same study and again found that self-efficacy and hope were not adequately distinguishable as separate factors. There are a number of possible explanations for this unexpected result.

First, there were a number of limitations in how the positive psychology constructs were assessed. For example, in the DEAS survey, the items of hope, optimism, and self-

efficacy were mixed together on the participant survey sheet rather than presented separately. Because of this, the original instructions were changed and different titles were added to the survey. The original measures were neither designed nor validated for such a situation. In addition, the Adult Hope Scale in this sample used a 4-point Likert scale, rather than an 8-point Likert scale recommended by Snyder (Snyder, 2002). This change could result in less variability in hope scores, which could make it more difficult to distinguish hope from self-efficacy. Also, the self-efficay scale in this study was a shortened 5-item version of the 10-item scale originally proposed by Schwarzer. The shortened version could reduce the validity of the items for capturing the construct of self-efficacy. Given these measurement differences, we do not know to what extent the DEAS measures of hope, optimism, and GSE validly captured the same constructs that were measured in previous studies. In general, future studies should make sure to administer the measures according to the originally published indications.

Second, there is evidence that Schwarzer's generalized self-efficacy scale does not satisfy criteria for measurement invariance across country. One study found that the 10-item version of Schwarzer's generalized self-efficacy scale had excellent psychometric properties for each country separately, but did not meet criteria for measurement invariance between samples from Brazil, Germany, and Colombia even after controlling for sex and age effects (Damasio et al., 2016). Furthermore, the bias was highest in the German sample. Although the authors did not have a clear conclusion as to why GSE may be interpreted differently within a German sample, their results suggest that GSE in a German sample may not mean the same thing at the same levels as GSE in a US sample.

Third, the generalized measure of self-efficacy, as opposed to a domain-specific measure, may be less distinguishable from other positive thinking constructs such as hope. Indeed, Bandura, recommended using domain-specific self-efficacy in research (Bandura, 1997). The importance of using a domain-specific measure of self-efficacy is further underlined by the fact that some items of Schwarzer's generalized self-efficacy scale have a face similarity to some items of Snyder's Adult Hope Scale. For example, "If I am in trouble, I can usually think of a solution (GSE)" and "I can think of many ways to get out of a jam" (AHS); "When I am confronted with a problem, I can usually find several solutions" (GSE) and "Even when others get discouraged, I know I can find a way to solve the problem" (AHS); "If I am in trouble, I can usually think of a solution" (GSE) and "Even when others get discouraged, I know I can find a way to solve the problem" (AHS). In fact, a regularized partial correlation of the GSE items and hope items found strong correlations between those specific items.

Fourth one study attempting to validate a new German measure of hope found that Schwarzer's 10-item self-efficacy scale had a significantly stronger correlation with the Adult Hope Scale (r = .74) than with the new German hope scale (r = .49; Krafft, A., Martin-Krumm, C., & Fenouillet, F., 2017). Furthermore, studies that found a distinct factor structure between hope and self-efficacy in the same model, did not use Schwarzer's measure of generalized self-efficacy (Carifio & Rhodes, 2002; Magaletta & Oliver, 1999; Herbert, 2011). A domain-specific measure of self-efficacy that could be appropriate for the present analysis is health-specific self-efficacy or life self-efficacy, given the aging sample (Becker, Stuifbergen, Oh, & Hall, 1993).

There are several additional limitations that are not directly related to the modeling of hope and GSE. First, the present study did not use the Life Orientation Test – Revised (LOT-R), which is the most research-supported measure of optimism. In the present study, optimism was measured with the Affective Valence of Future Time Perspective Scale which was designed for the DEAS and has not had widespread use outside of the DEAS (Brandtstädter & Wentura, 1994). Therefore, it is not clear whether the DEAS measure of optimism captures the same construct as the LOT-R.

In addition, the present study was cross-sectional rather than longitudinal. Future studies could utilize a longitudinal analysis in order to control for baseline levels of the outcomes, and provide stronger support for a causal relationship between predictors and outcomes.

Finally, while the older, German sample in the present study is a strength in that it represents a different population than the typical American college sample, it also presents a limitation insofar as it is unclear to what extent the current sample characteristics affect the validity and reliability of the measures and the interpretation of the results. There are a number of characteristics of the present sample that differentiate it from the samples of most previous studies. The present sample was older, with an average age of 62, whereas as most studies in this area utilize college students. The age difference likely means a substantial difference in physical health, social relationships, and engagement in activities, all of which could differentially impact participants' pursuit of goals (Charles & Carstensen, 2010). In addition, the present sample was German rather than American. All though the cultures are both Western and predominantly White, there could be a difference in mental health and illness given differences in epidemiology such as diet, social support, and access to

healthcare. It is also unclear how the language difference could impact the validity of the measures. While the German version of the measures used in the present study are consistent in back translation, it is less to what extent the there is a conceptual equivalence between an English term and the German translation of it (Dittman-Kohli et al., 1997; Schwarzer & Jerusalem, 1999; Watson, Clark, & Tellegen, 1988; Schumacher, Klaiberg, & Brähler, 2003). Given the cultural differences with this sample, it would also be interesting to examine additional well-being outcomes such as social well-being and eudaimonic well-being (Keyes, 1998; Ryff & Keyes, 2005). Given research on self-efficacy and motivation, it would also be interesting to account for the impact of outcome expectancy on self-efficacy (Williams & Rhodes, 2016).

Conclusions

The present study attempted to measure the unique contributions of hope, optimism, and GSE on SWB and depression in a sample of German adults. However, I was not able to address this initial aim because hope and GSE were statistically indistinguishable in this dataset and were better modeled as one rather than two factors. This is probably due to problems with how GSE was measured, because there is strong theoretical and empirical support for the distinctiveness of these two factors.

With those measurement issues in mind, as could be expected from the hypotheses and literature, hope/GSE and optimism had strong latent correlations among themselves (r = .74), strong latent correlations with positive affect (r = .70, r = .62) and satisfaction with life (r = .68, r = .77), and moderate to strong latent correlations with lower negative affect (r = -.42, r = -.41) and depression respectively (r = -.44, r = -.52). Similarly, as could be expected, hope/GSE and optimism in isolation are strong predictors of positive affect (B = .70, B =

.62), satisfaction with life (B = .69, B = .77), and lower depression (B = -.44, B = -.52), and moderate to strong predictors of negative affect respectively (B = -.42, B = -.42). Finally, when examining the unique impact of hope/GSE and optimism in the same model, hope/GSE is a stronger predictor of positive affect (B = .53 vs B = .22), optimism is a stronger predictor of satisfaction with life (B = .57 vs B = .26) and lower depression (B = -.44 vs B = -.12), and the two are about equal predictors of lower negative affect (B = -.25 for hope, B = -.23 for optimism).

This last result addressed our main study aim. However, the interpretation of the result is greatly limited by the necessity of combining hope and GSE which is contrary to a large body of literature and is likely due to changes in the assessment tools that were used. Therefore, given the data collection procedures, this study is not able to adequately measure the unique effect of hope, optimism, and GSE on SWB and depression. While I was aware of some of the measurement limitations, the modifications to the study measures had an even bigger impact than expected on the overall results and consequently the ability to interpret the results. However, given the large body of literature, I would expect the constructs of hope, optimism, and GSE to be distinctive predictors of mental health and illness if the appropriate measures are used (Herbert, 2011; Carifio & Rhodes, 2002; Magaletta & Oliver, 1999).

As the exploration of the unique predictive power of hope, optimisms, and self-efficacy on mental health and well-being continues, future studies would do well to use large, non-traditional samples as was the case in my study. However, future studies should also use the most empirically validated scales for positive thinking constructs and ensure that they are

administered in accord with published guidelines so that positive psychology research can continue to provide robust empirical findings to the next generation of researchers.

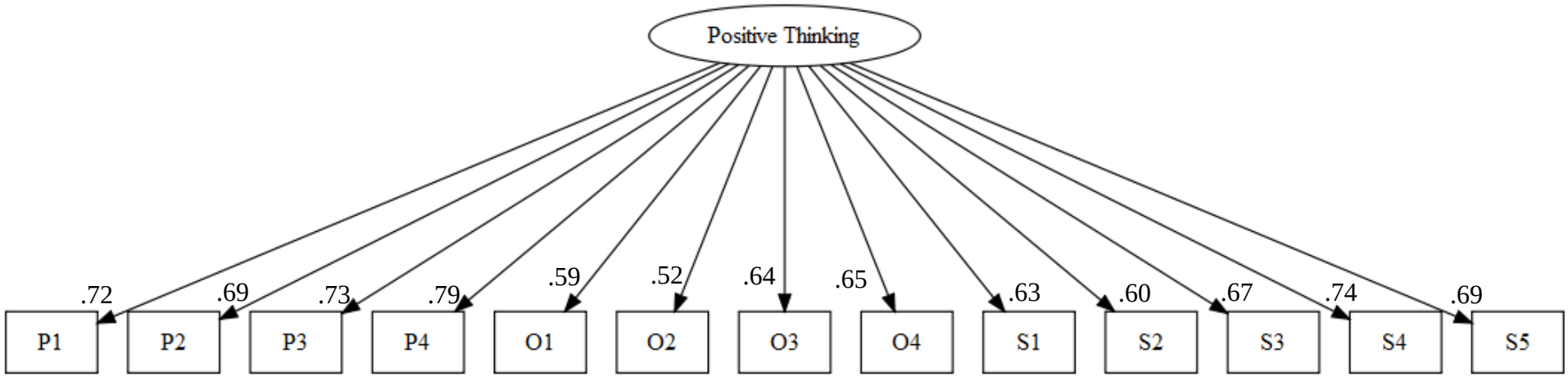

Figure 1. Confirmatory factor analysis model of positive thinking as unitary construct. Abbreviations: P1-4, Hope Parcels 1-4; O1-4, Optimism Item 1-4; S1-5, Self-efficacy Item 1-5.

Model	χ^2 (df)	RMSEA	CFI	TLI	SRMR
1 Factor	3157.37 (65)	.09	.88	.86	.05

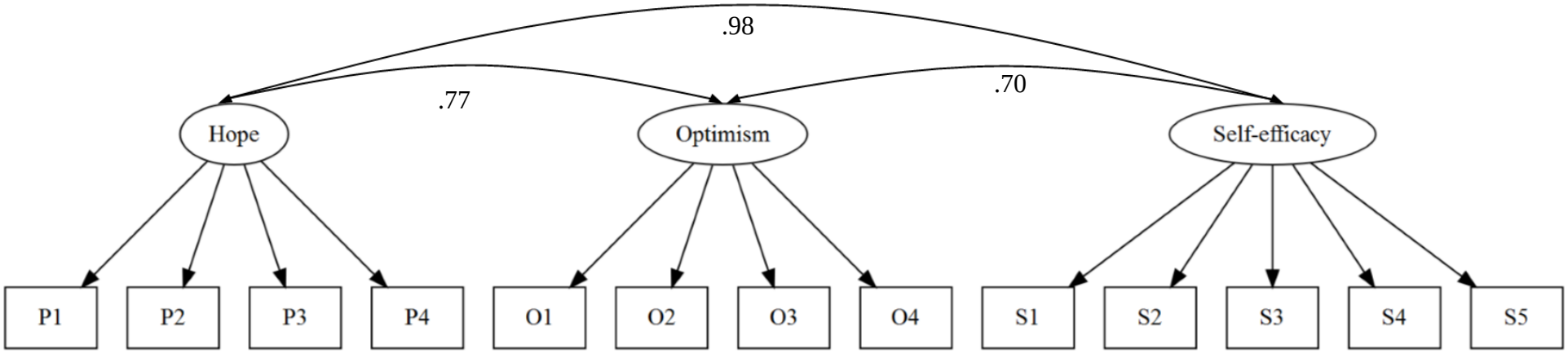

Figure 2. Confirmatory factor analysis of hope, optimism, and self-efficacy as separate constructs. Abbreviations: P1-4, Hope Parcels 1-4; O1-4, Optimism Item 1-4; S1-5, Self-efficacy Item 1-5.

Model	χ^2 (df)	RMSEA	CFI	TLI	SRMR
3 Factor	1025.14 (62)	.05	.96	.96	.03

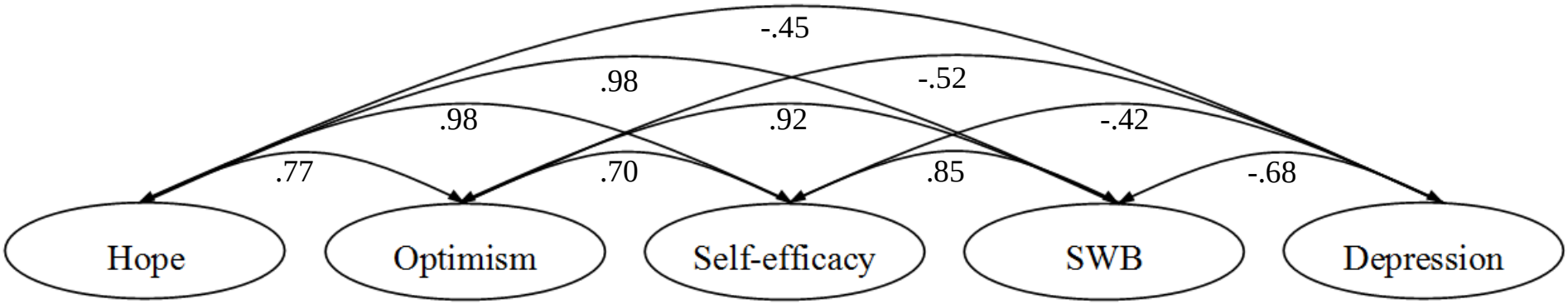

Figure 3. Confirmatory factor analysis model of latent correlations among predictor and outcome variables. Observed indicators not shown for visual clarity. Abbreviation: SWB, subjective well-being.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
2317.26 (142)	.05	.95	.94	.03

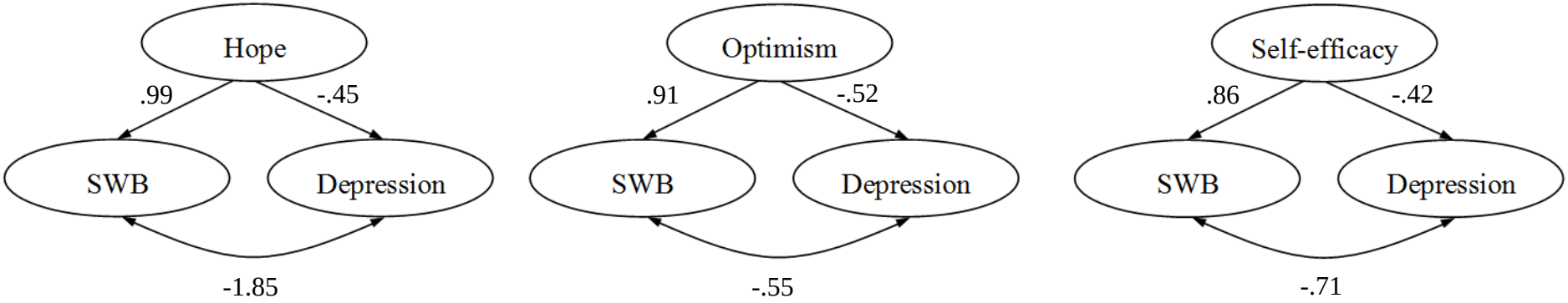

Figure 4. Structural equation models of the latent regressions of the predictor variables in isolation. Abbreviation: SWB, subjective well-being. *Note*. All parameters are completely standardized.

Model	χ^2 (df)	RMSEA	CFI	TLI	SRMR
Hope	721.41 (32)	.06	.97	.95	.03
Optimism	767.10 (32)	.06	.96	.95	.04
GSE	707.63 (41)	.05	.97	.95	.03

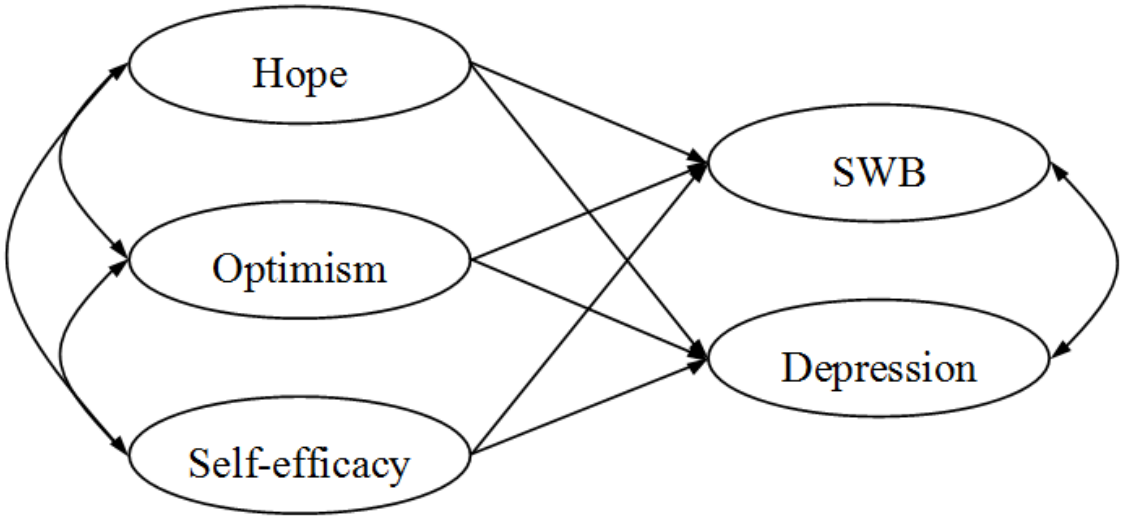

Figure 5. Structural equation model of the latent regressions with all predictors in the same model. Abbreviation: SWB, subjective well-being. *Note.* The values for this model are not reported because many of them fall outside the range of possible values due to violation of assumptions. All parameters are completely standardized.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
2317.26 (142)	.05	.95	.94	.03

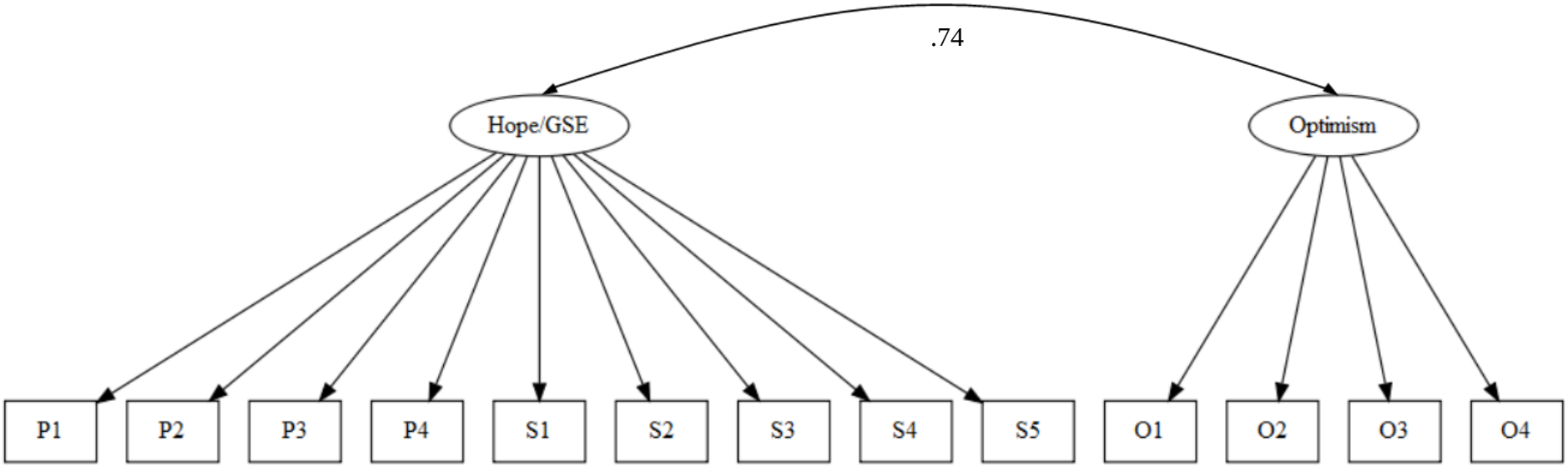

Figure 6. Confirmatory factor analysis of hope/self-efficacy as a combined construct with optimism as a separate construct. Abbreviations: P1-4, Hope Parcels 1-4; O1-4, Optimism Item 1-4; S1-5, Self-efficacy Item 1-5.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
1110.45 (64)	.05	.96	.95	.03

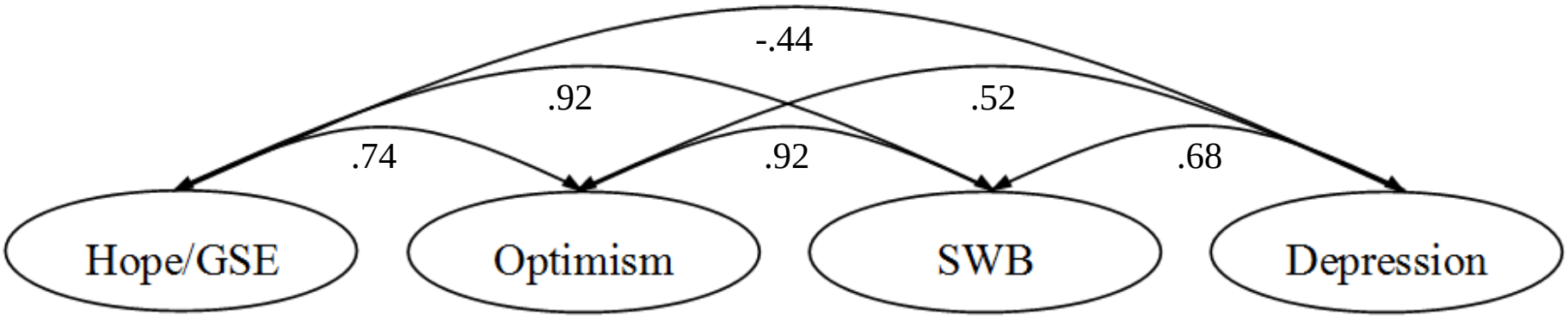

Figure 7. Confirmatory factor analysis model of latent correlations among predictor and outcome variables using the one-factor model of hope/GSE.

Abbreviations: GSE, generalized self-efficacy; SWB, subjective well-being.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
2564.78 (146)	.05	.95	.94	.04

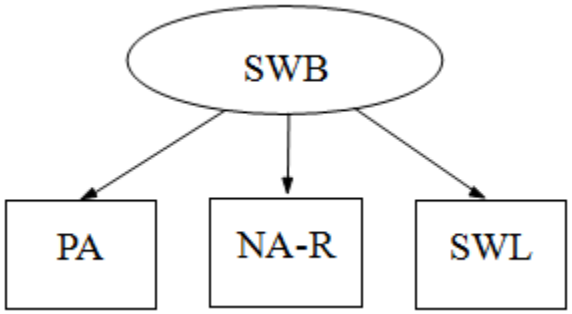

Figure 8a. Higher order factor structure of subjective well-being. Abbreviations: PA, Positive Affect; NA-R, Negative Affect-Reverse Coded; SWL, Satisfaction with Life.

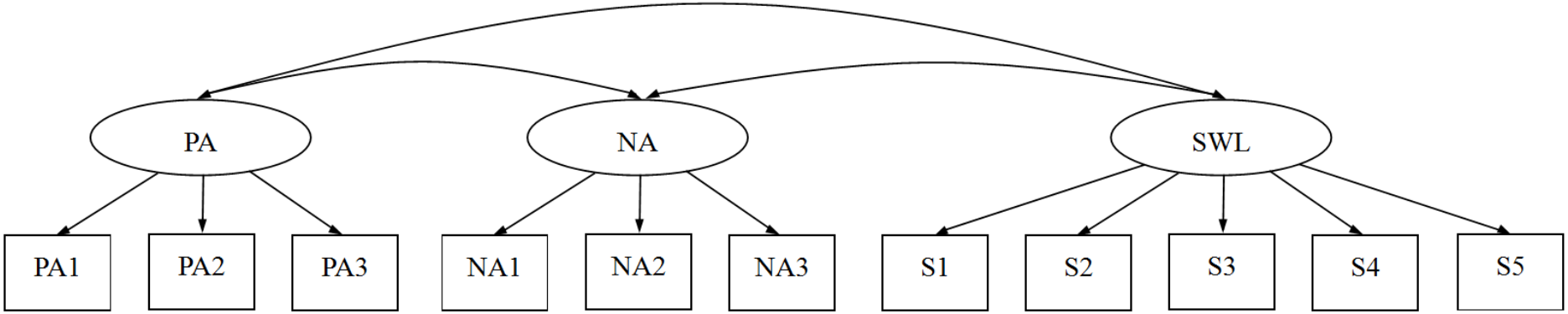

Figure 8b. Lower order factor structure of subjective well-being. Abbreviations: PA1-3, Positive Affect Parcels 1-3; NA1-3, Negative Affect Parcels 1-3; S1-5, Satisfaction with Life Item 1-5.

Model	χ^2 (df)	RMSEA	CFI	TLI	SRMR
1 Factor	10146.30 (44)	.20	.60	.50	.13
3 Factor	1170.93 (41)	.07	.96	.94	.04

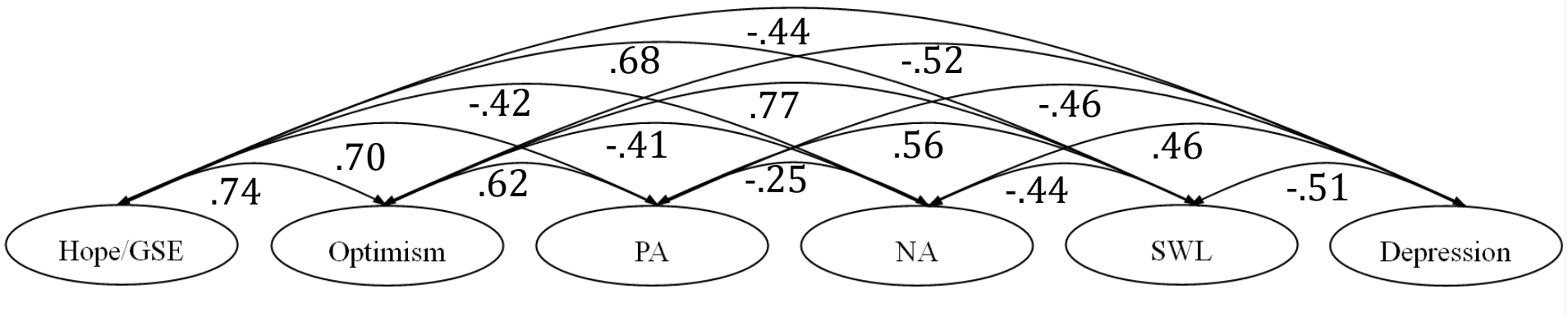

Figure 9. Confirmatory factor analysis model of latent correlations among predictor and outcome variables using the one-factor model of hope/GSE and the three-factor model of SWB. Abbreviations: GSE, generalized self-efficacy; PA, positive affect; NA, negative affect; SWL, satisfaction with life; SWB, subjective well-being.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
4359.35 (309)	.05	.94	.93	.04

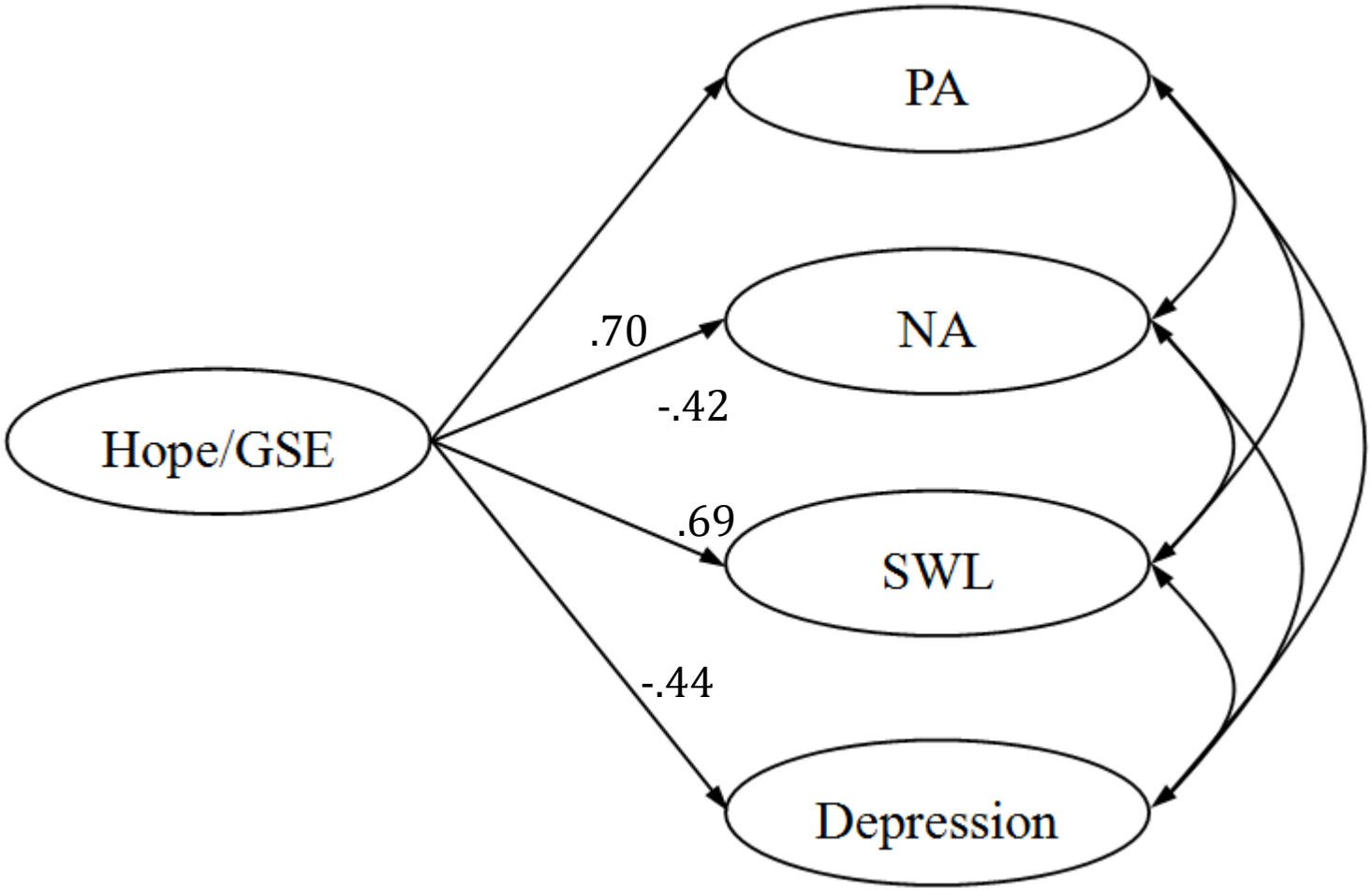

Figure 10. Structural equation model of the latent regressions of combined hope/GSE on the outcomes. Abbreviations: GSE, generalized self-efficacy; PA, positive affect; NA, negative affect; SWL, satisfaction with life. *Note*. All parameters are completely standardized.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
3136.49 (220)	.05	.95	.94	.04

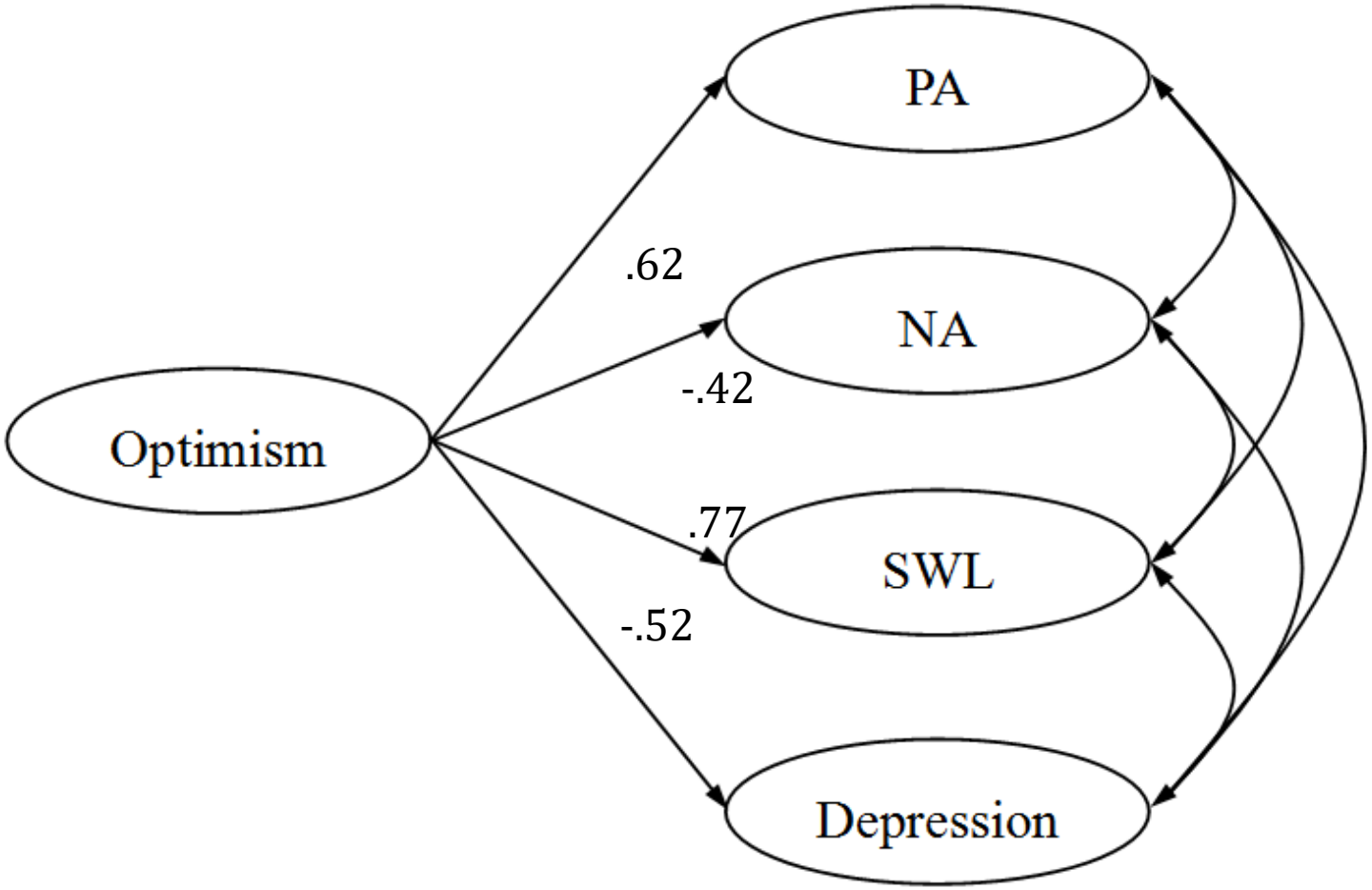

Figure 11. Structural equation model of the latent regressions of optimism on the outcomes. Abbreviations: PA, positive affect; NA, negative affect; SWL, satisfaction with life. *Note*. All parameters are completely standardized.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
2193.61 (125)	.05	.95	.94	.04

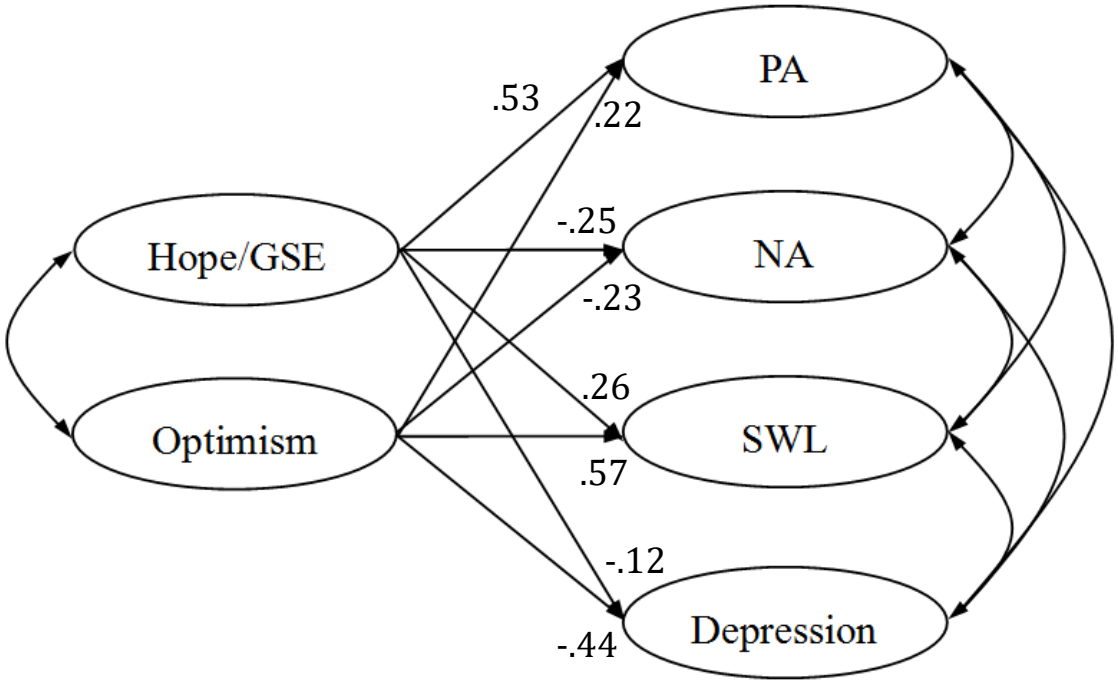

Figure 12. Structural equation model of the latent regressions with all predictors in the same model using the one-factor model of hope/GSE and the three-factor model of subjective well-being. Abbreviations: GSE, generalized self-efficacy; PA, positive affect; NA, negative affect; SWL, satisfaction with life. *Note*. All parameters are completely standardized.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
2317.26 (142)	.05	.95	.94	.03

Table 1.
Means, Standard Deviations, & Correlations of Study Variables

Variable	*n*	*M*	*SD*	1	2	3	4	5	6
1. Hope	6073	3.04	.45						
2. Optimism	6074	2.90	.60	.64					
3. Self-efficacy	6053	3.02	.48	.80	.58				
4. Positive Affect	6031	3.52	.56	.62	.53	.53			
5. Negative Affect	6033	2.01	.55	-.36	-.35	-.35	-.21		
6. Satisfaction with Life	6038	3.78	.75	.62	.63	.54	.47	-.39	
7. Depression	6074	6.16	6.00	-.37	-.44	-.35	-.39	.40	-.42

Note. All correlations are statistically significant at $p < .01$.

Table 2.
Latent Correlations between Hope/GSE, Optimism, Positive Affect, Negative Affect, and Depression (*n* = 6077)

Variable	1	2	3	4	5
1. Hope/GSE					
2. Optimism	.74 .72: .76				
3. Positive Affect	.70 .68 : 72	.62 .59 : .64			
4. Negative Affect	-.42 -.45 : -.39	-.41 -.44 : .-39	-.25 -.28 : -.21		
5. Satisfaction with Life	.68 .67 : .70	.77 .75 : .78	.56 .54 : .59	-.44 -.47 : -.41	
6. Depression	-.44 -.47 : -.41	-.52 -.55 : -.50	-.46 -.49 : -.43	.46 .43 : .49	-.51 -.54 : -.48

Note. All correlations are statistically significant at p <.001. Values separated by colons represent 95% confidence intervals. Abbreviations: GSE, Generalized Self-efficacy.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
4359.35 (309)	.05	.94	.93	.04

Table 3.
Confirmatory Factor Analysis Results of Competing Models of Positive Thinking and Subjective Well-being

	Latent Structure	χ^2	*df*	CFI	TLI	RMSEA	90% CI	SRMR
Positive Thinking	One-factor	3157.37	65	.88	.86	.09	.086-.091	.05
	Two-factor	1110.45	64	.96	.95	.05	.049-.055	.03
	Three-factor	1025.14	62	.96	.96	.05	.048-.053	.03
Subjective Well-being	One-factor	10146.30	44	.60	.50	.20	.192-.198	.13
	Three-factor	1170.93	41	.96	.94	.07	.064-.071	.04

Table 4.

Latent Regressions between Hope/GSE, Optimism, Positive Affect, Negative Affect, and Depression (*n* = 6077)

Predictor	B (95% CI)	*β* (95% CI)
Hope/GSE → Positive Affect	.64 (.59 : .69)	.53 (.49 : .57)
Hope/GSE → Negative Affect	-.30 (-.36 : -.24)	-.25 (-.30 : -.20)
Hope/GSE → Satisfaction with Life	.44 (.37 : .51)	.26 (.22 : .30)
Hope/GSE → Depression	-.11 (-.15 : -.06)	-.12 (-.17 : -.06)
Optimism → Positive Affect	.25 (.20 : .30)	.22 (.18 : .27)
Optimism → Negative Affect	-.26 (-.32 : -.20)	-.23 (-.28 : -.18)
Optimism → Satisfaction with Life	.90 (.83 : .97)	.57 (.53 : .61)
Optimism → Depression	-.37 (-.42 : -.33)	-.44 (-.49 : -.39)

Notes. All effects are statistically significant at p <.001. All parameters are completely standardized. Abbreviations: GSE, Generalized Self-efficacy.

χ^2 (df)	RMSEA	CFI	TLI	SRMR
2317.26 (142)	.05	.95	.94	.03

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Appendix A: List of Measures

Hope (AHS, Snyder et al., 1991)	Directions: Read each item carefully. Using the scale shown below, please select the number that best describes YOU and put that number in the blank provided. **Pathways** 1. I can think of many ways to get the things in life that are most important to me 2. I can think of many ways to get out of a jam 3. Even when others get discouraged, I know I can find a way to solve the problem 4. There are lots of ways around any problem **Agency** 5. I've been pretty successful in life 6. I energetically pursue my goals 7. I meet the goals that I set for myself 8. My past experiences have prepared me well for my future 1 = Strongly agree 2 = Agree 3 = Disagree 4 = Strongly disagree
Optimism (Brandtstädter & Wentura, 1994)	1. I am looking forward to the life ahead of me 2. For me the future is full of hope (Dropped) 3. Thinking about my future makes me worry (Reversed) 4. I look to the future with confidence 5. The future holds a lot of good in store for me

	1 = strongly agree 2 = agree 3 = disagree 4 = strongly disagree
Self-efficacy (Schwarzer & Jerusalem, 1999)	1. It is easy for me to stick to my aims and accomplish my goals 2. I can usually handle whatever comes my way 3. I can solve most problems if I invest the necessary effort 4. If I am in trouble, I can usually think of a solution 5. When I am confronted with a problem, I can usually find several solutions 1 = strongly agree 2 = agree 3 = disagree 4 = strongly disagree
Positive affect (PANAS, Watson et al., 1988)	In the following you will find a number of words that describe different feelings and emotions. Please indicate to what extent you have felt this way during the past few months. 1. Enthusiastic 2. Excited 3. Strong 4. Interested 5. Proud 6. Alert 7. Inspired 8. Determined 9. Attentive 10. Active 1 = Very slightly or not at all 2 = A little

	3 = Moderately 4 = Quite a bit 5 = Extremely
Negative affect (PANAS, Watson et al., 1988)	In the following you will find a number of words that describe different feelings and emotions. Please indicate to what extent you have felt this way during the past few months. 1. Distressed 2. Upset 3. Guilty 4. Scared 5. Hostile 6. Irritable 7. Ashamed 8. Nervous 9. Jittery 10. Afraid 1 = Very slightly or not at all 2 = A little 3 = Moderately 4 = Quite a bit 5 = Extremely
Satisfaction with Life (SWL, Pavot & Diener, 1993)	1. In most ways my life is close to my ideal 2. The conditions of my life are excellent 3. I am satisfied with my life 4. So far I have gotten the important things I want in life 5. If I could live my life over, I would change almost nothing 1 = Strongly agree 2 = Agree

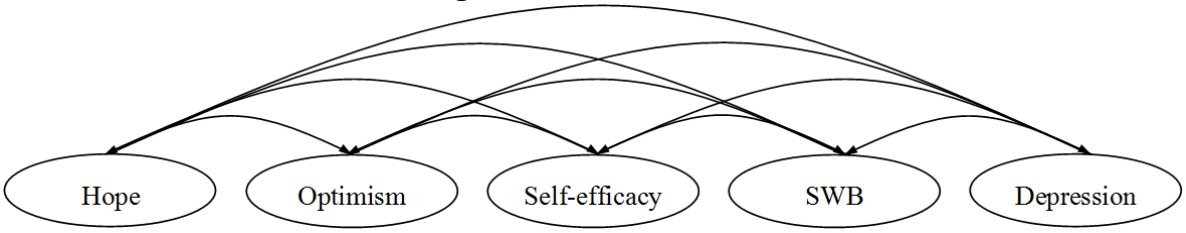
	3 = Neither agree nor disagree 4 = Disagree 5 = Strongly disagree
Depression (Hautzinger & Bailer, 1993)	During the past week… 1. I was bothered by things that usually don't bother me 2. I felt that I could not shake off the blues even with help from my family or friends 3. I had trouble keeping my mind on what I was doing 4. I felt depressed 5. I felt that everything I did was an effort 6. I thought my life had been a failure 7. I felt fearful 8. My sleep was restless 9. I was happy (Reversed) 10. I talked less than usual 11. I felt lonely 12. I enjoyed life (Reversed) 13. I felt sad 14. I felt that people dislike me 15. I could not get "going" 1 = Rarely or none of the time (less than 1 day) 2 = Some or a little bit of the time (1 to 2 days) 3 = Occasionally or a moderate amount of time (3 to 4 days) 4 = Most or all of the time (5 to 7 days)

Appendix B: Originally Proposed Models Not Included in Final Analyses

The following models are included:

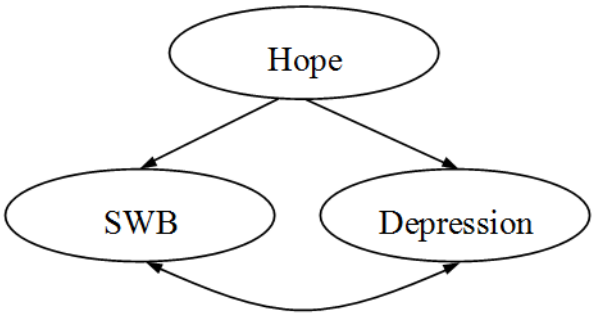
1. Latent Correlations Among All Predictors and Outcomes
2. Hope in Isolation on SWB and Depression
3. Optimism in Isolation on SWB and Depression
4. Self-efficacy in Isolation on SWB and Depression
5. Latent Regressions Among All Predictors and Outcomes

1. Latent Correlations Among All Predictors and Outcomes



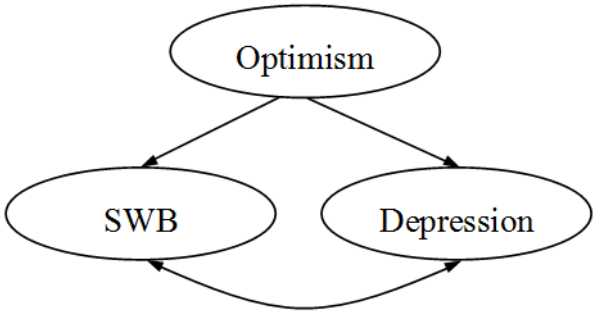
Latent correlations among all predictor and outcome variables were examined using CFA. The model showed good fit, χ^2 (df = 142) = 2317.26, $p < .01$, RMSEA = .05, CFI = .95, TLI = .94, SRMR = .03). The latent constructs had acceptable loadings. However hope had unrealistically high latent correlations with self-efficacy (β = .98) and SWB (β = .98). Mplus reported the PSI error that the covariance matrix is not positive definite with the problem involving SWB.

2. Hope in Isolation on SWB and Depression



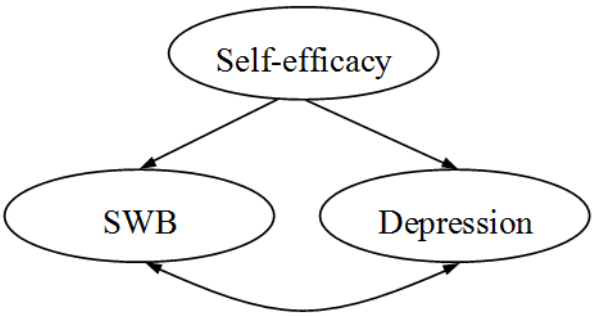
The model of hope in isolation predicting SWB, and depression showed acceptable fit, χ^2 (df = 32) = 721.41, p < .01, RMSEA = .06, CFI = .97, TLI = .95, SRMR = .03). Hope was a statistically significant predictor of higher SWB (β = .99; .97 : 1.01) and lower depression (β = -.45; -.48 : -.42).

3. Optimism in Isolation on SWB and Depression



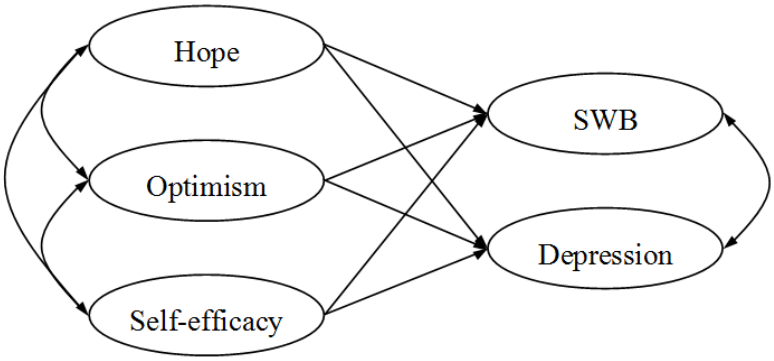
The model of optimism in isolation predicting SWB, and depression showed acceptable fit, χ^2 (df = 32) = 767.10, p < .01, RMSEA = .06, CFI = .96, TLI = .95, SRMR = .04). Optimism was a statistically significant predictor of higher SWB (β = .91; .89 : .93) and lower depression (β = -.52; -.55 : -.50).

4. Self-efficacy in Isolation on SWB and Depression



The model of self-efficacy in isolation predicting SWB, and depression showed acceptable fit, χ^2 (df = 41) = 707.63, p < .01, RMSEA = .05, CFI = .97, TLI = .95, SRMR = .03). Self-efficacy was a statistically significant predictor of higher SWB (β = .86; .83 : .88) and lower depression (β = -.42; -.45 : -.39).

5. Latent Regressions Among All Predictors and Outcomes



The model of hope, optimism, and self-efficacy predicting SWB and depression showed acceptable fit, χ^2 (df = 142) = 2317.26, p < .01, RMSEA = .05, CFI = .95, TLI = .94, SRMR = .03). Hope was a statistically significant predictor of higher SWB (β = 3.05; 1.44: 4.65) and lower depression (β = .07; -.49 : .64). Optimism was a statistically significant predictor of higher SWB (β = .11; -.16: .37) and lower depression (β = -.46; -.56 : -.35). Self-efficacy was a statistically significant predictor of higher SWB (β = -2.20; -3.62: -.78) and lower depression (β = -.17; -.67 : .32).